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CENTRAL FORECASTING TECHNICAL NOTE NO. 8

AVIATION CLIMATOLOGY DERIVED FROM THE OPERATIONAL MODEL MAY 1983 - MAY 1991

BY

P M GRIMES

OCT 1992

Headquarters, Bracknell

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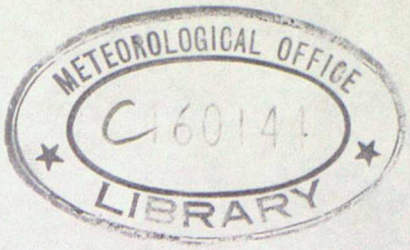

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AVIATION CLIMATOLOGY DERIVED FROM THE OPERATIONAL MODEL MAY 1983 - MAY 1991

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INTRODUCTION

A new climatology database for aviation has been produced from archived data stored from May 1983 to May 1991. It consists of twelve files in GRIB code containing averages of climatological fields for all Januarys etc., calculated from the 15 level model data[1]. This report gives a brief outline of how the data were accumulated and processed, and the content of the database. There are also some sample charts of wind arrows, heights, and temperatures at 300mb for January and July, and a description of GRIB code.

ACCUMULATION AND PROCESSING OF THE CLIMATOLOGY DATA

The 15 level model is run four times a day to produce analysis fields, and twice a day to produce forecast fields. From the midnight and midday runs, certain fields on the standard set of constant pressure surfaces in the atmosphere (levels) are extracted at full model resolution. These are stored on tape to create a permanent archive. Every month since May 1983, wind components, height, temperature and relative humidity fields have been extracted for the past month from the archives of the operational global analyses, in order to produce averages for the month.

The archived fields were stored in PP format datasets, by using the Meteorological Office post-processing (PP) package. This is a general purpose software package for the handling and display of meteorological fields. Each field in the dataset has a PP header associated with it, which gives information about the field. From May 1983 to October 1986, the archived fields were accumulated as a spectral archive, while from November 1986 to May 1991 the archived fields were stored as a packed grid point archive. The spectral archive had 40*40 wavenumbers, which worked out as an equivalent resolution of about 4° latitude-longitude. However, the grid point archive had 192*121 grid points with the data accumulated at the model grid points themselves. Using the archived PP datasets, averages were calculated on a monthly basis, of wind components, height, temperature and relative humidity for the past month and stored in another PP format dataset.

The next stage was to create the climatologies of the combined spectral and grid point archives for the nine years, and producing twelve monthly summaries for Januarys, Februarys, etc. The PP package was used to extract the fields from the archive and interpolate onto a grid with 72*72 grid points, to give a resolution of $2.5^{\circ}*5.0^{\circ}$ latitude-longitude. Extracting fields from the spectral archive required converting the spherical harmonic components to a latitude-longitude grid. All the data were then combined together for each month and averages found for each field. The resulting summaries were written to a separate dataset for each month and charts produced using an in-house chart package. Finally twelve monthly climatology files of GRIB bulletins, for each field at each level, were produced from the datasets.

[1] Described in : A.J. GADD. 1985 The 15 level weather prediction model. Met. Mag. 114, 222-226.

CONTENT OF THE CLIMATOLOGY DATABASE

Each of the twelve monthly climatology files contains averages of the following fields, at the following levels for the corresponding month:

U component wind	950, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50 mb
V component wind	
height	
temperature	
relative humidity	950, 850, 700, 500, 400, 300 mb

The fields are stored within the file in the same order as above. All the levels for the corresponding field are stored after each other. The time period for averaging of each file is as follows:

JANUARY : 1984-91

FEBRUARY : 1984-91

MARCH : 1984-91

APRIL : 1984-91

MAY : 1983-91

JUNE : 1983-90

JULY : 1983-90

AUGUST : 1983-90

SEPTEMBER : 1983-90

OCTOBER : 1983-90

NOVEMBER : 1983-90

DECEMBER : 1983-90

DECODE OF GRIB BULLETIN HEADER

The GRIB header is made up of three blocks: the indicator (Block 0), the product definition (Block 1) and the grid description (Block 2). The GRIB binary code consists of a continuous bit-stream made up of a sequence of octets. The content of these octets in each block is given below:

BLOCK 0 - INDICATOR BLOCK

Octet:		
	1-4	GRIB (coded alphabetically)

BLOCK 1 - PRODUCT DEFINITION BLOCK

Octet:		
	1-3	Length of block
	4	Version number
	5	Identification of centre
	6	Model number run
	7	Grid definition (coded as '255' if grid description section included)
	8	Flag to show if grid description section included
	9	GRIB field type
	10	Type of level
	11-12	Level
	13	Year
	14	Month
	15	Day
	16	Hour
	17	Minute
	18	Units of time
	19-end	Not used at present

BLOCK 2 - GRID DESCRIPTION BLOCK

Octet:		
	1-3	Length of block
	4	Number of unused bytes at end of Block 2
	5	Set to zero
	6	Type of grid
	7-32	Definition of grid
	33-end	Not used at present

SAMPLE CHARTS

Some sample charts of wind arrows, heights and temperatures are included. A description of each chart is given below:

FIGURE 1(A)
FIGURE 1(B) } Average wind arrows at 300mb for January in equatorial region
FIGURE 1(C)

FIGURE 2(A) Average wind arrows at 300mb for January in northern hemisphere

FIGURE 2(B) Average wind arrows at 300mb for January in southern hemisphere

FIGURE 3(A)
FIGURE 3(B) } Average heights at 300mb for January in equatorial region
FIGURE 3(C)

FIGURE 4(A) Average heights at 300mb for January in northern hemisphere

FIGURE 4(B) Average heights at 300mb for January in southern hemisphere

FIGURE 5(A)
FIGURE 5(B) } Average temperatures at 300mb for January in equatorial region
FIGURE 5(C)

FIGURE 6(A) Average temperatures at 300mb for January in northern hemisphere

FIGURE 6(B) Average temperatures at 300mb for January in southern hemisphere

FIGURE 7(A)
FIGURE 7(B) } Average wind arrows at 300mb for July in equatorial region
FIGURE 7(C)

FIGURE 8(A) Average wind arrows at 300mb for July in northern hemisphere

FIGURE 8(B) Average wind arrows at 300mb for July in southern hemisphere

FIGURE 9(A)
FIGURE 9(B) } Average heights at 300mb for July in equatorial region
FIGURE 9(C)

FIGURE 10(A) Average heights at 300mb for July in northern hemisphere

FIGURE 10(B) Average heights at 300mb for July in southern hemisphere

FIGURE 11(A) }
FIGURE 11(B) } Average temperatures at 300mb for July in equatorial region
FIGURE 11(C) }

FIGURE 12(A) Average temperatures at 300mb for July in northern hemisphere

FIGURE 12(B) Average temperatures at 300mb for July in southern hemisphere

AVERAGE WIND ARROWS(KT) FOR JANUARY AT 300MB (EQUATORIAL REGION)

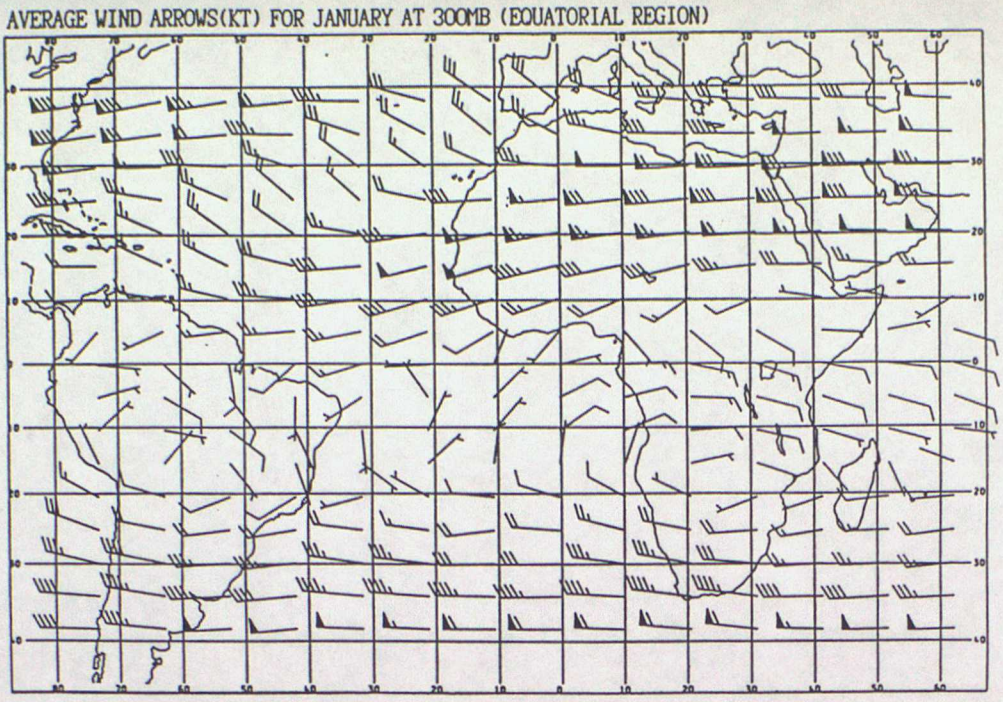

FIGURE 1(A)

AVERAGE WIND ARROWS(KT) FOR JANUARY AT 300MB (EQUATORIAL REGION)

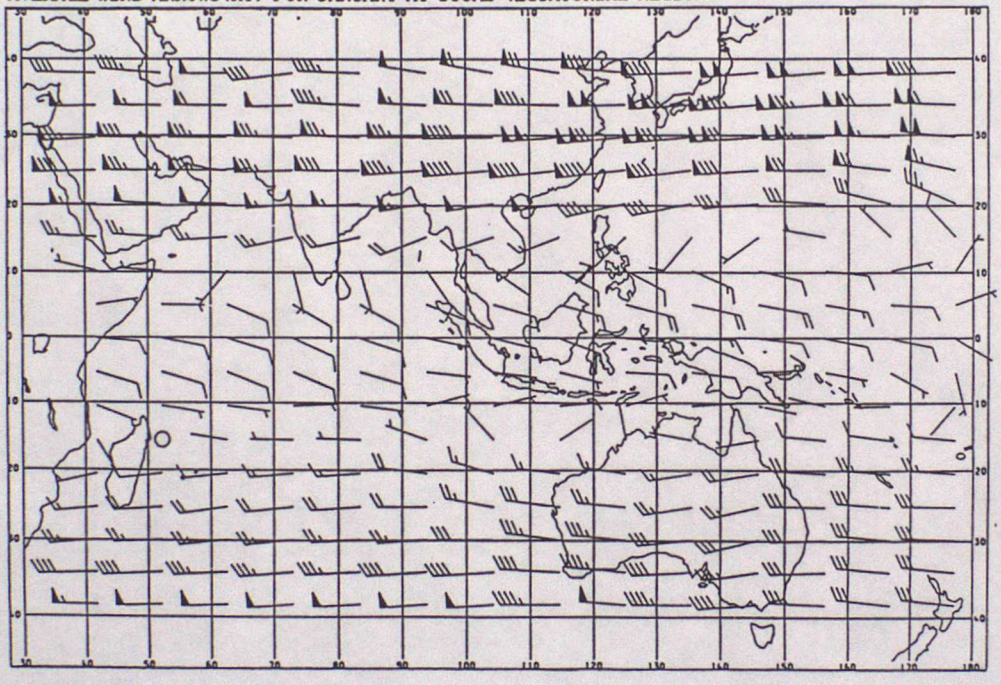

FIGURE 1(B)

AVERAGE WIND ARROWS(KT) FOR JANUARY AT 300MB (EQUATORIAL REGION)

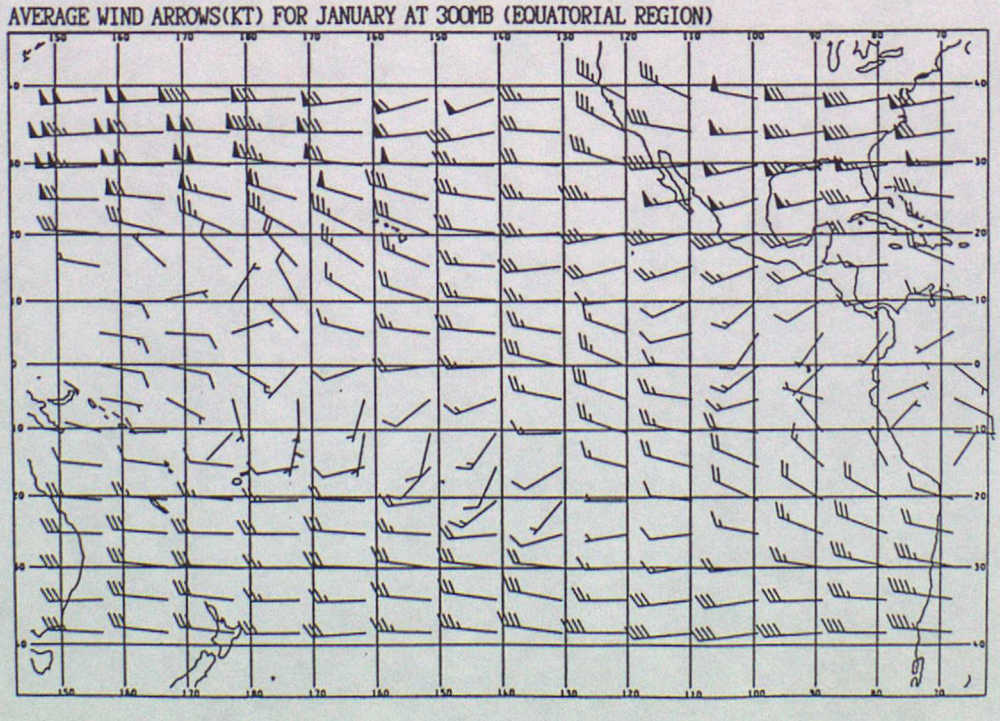

FIGURE 1(C)

AVERAGE WIND ARROWS(KT) FOR JANUARY AT 300MB (N. HEMISPHERE)

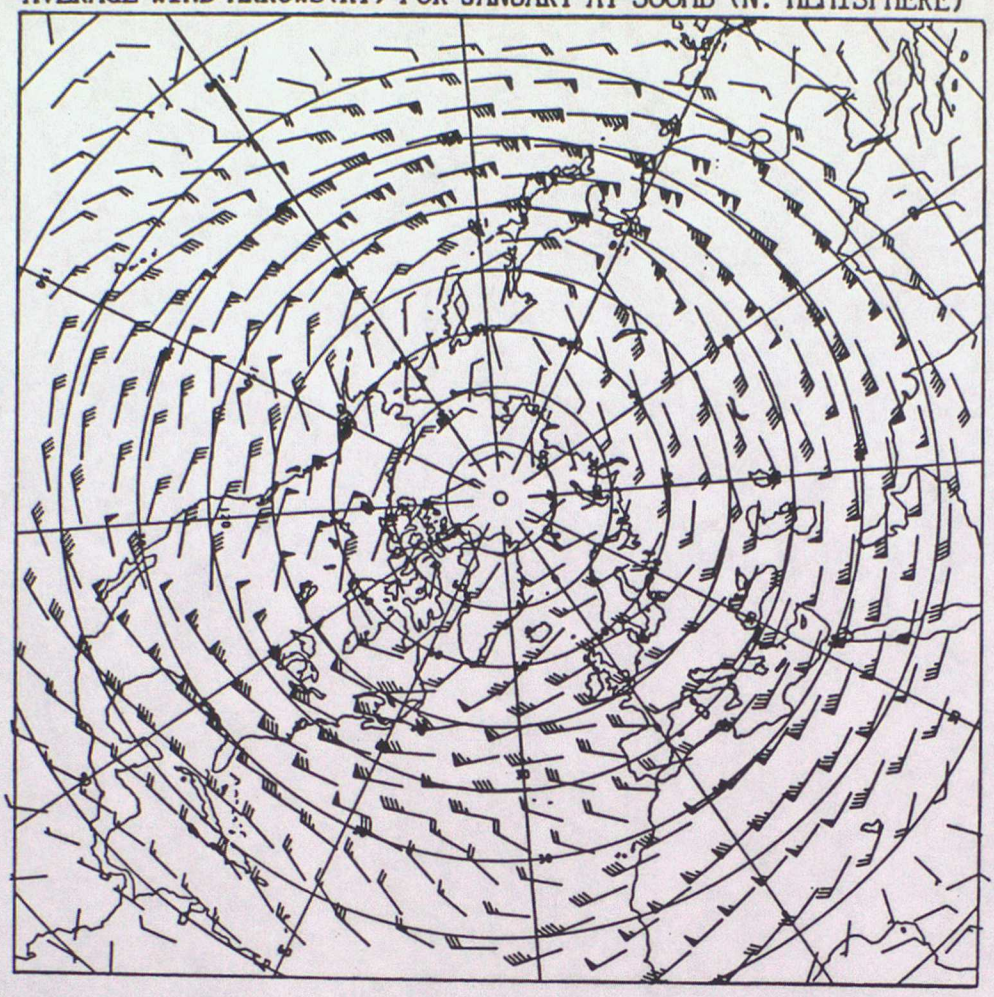

FIGURE 2(A)

AVERAGE WIND ARROWS(KT) FOR JANUARY AT 300MB (S. HEMISPHERE)

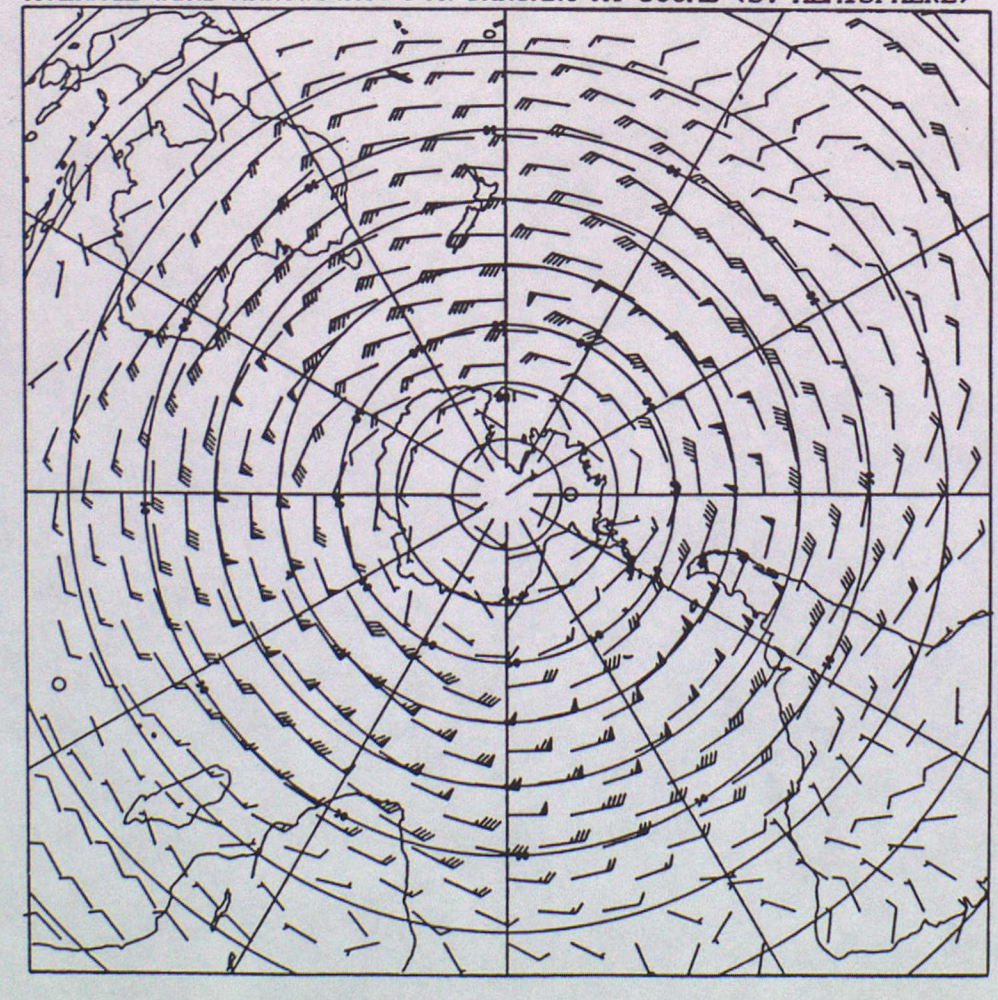

FIGURE 2(B)

AVERAGE HEIGHTS(DM) FOR JANUARY AT 300MB (EQUATORIAL REGION)

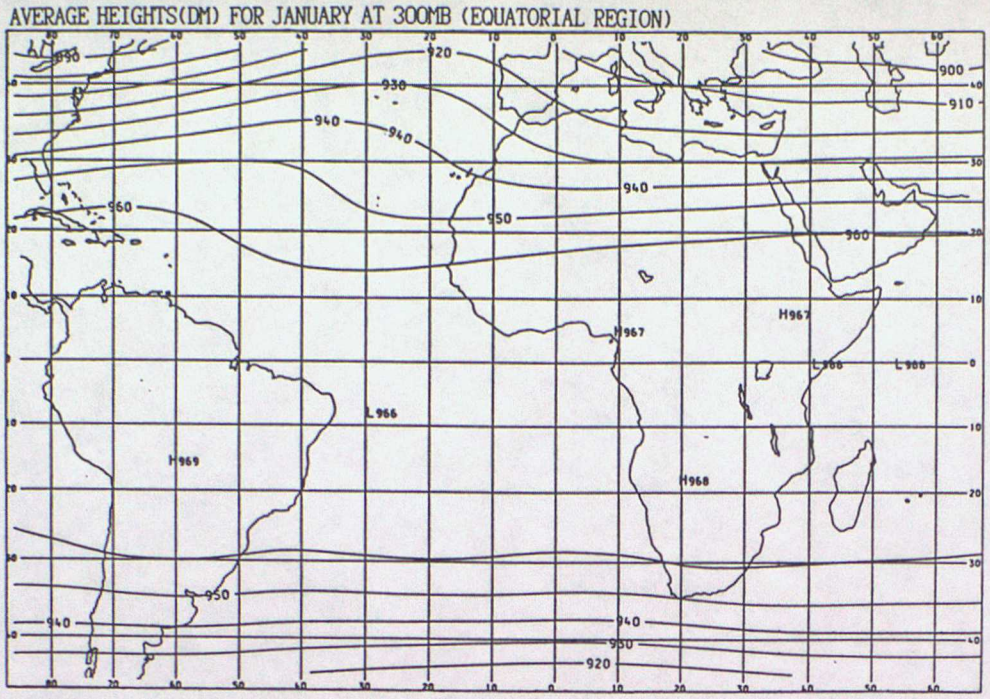

FIGURE 3(A)

AVERAGE HEIGHTS(DM) FOR JANUARY AT 300MB (EQUATORIAL REGION)

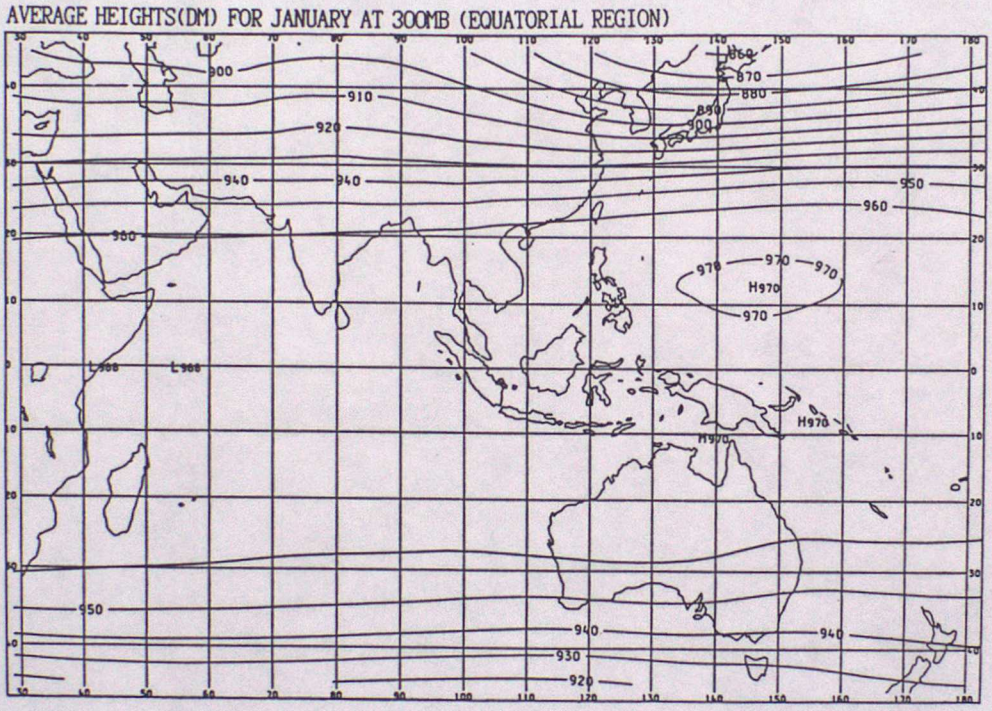

FIGURE 3(B)

AVERAGE HEIGHTS(DM) FOR JANUARY AT 300MB (EQUATORIAL REGION)

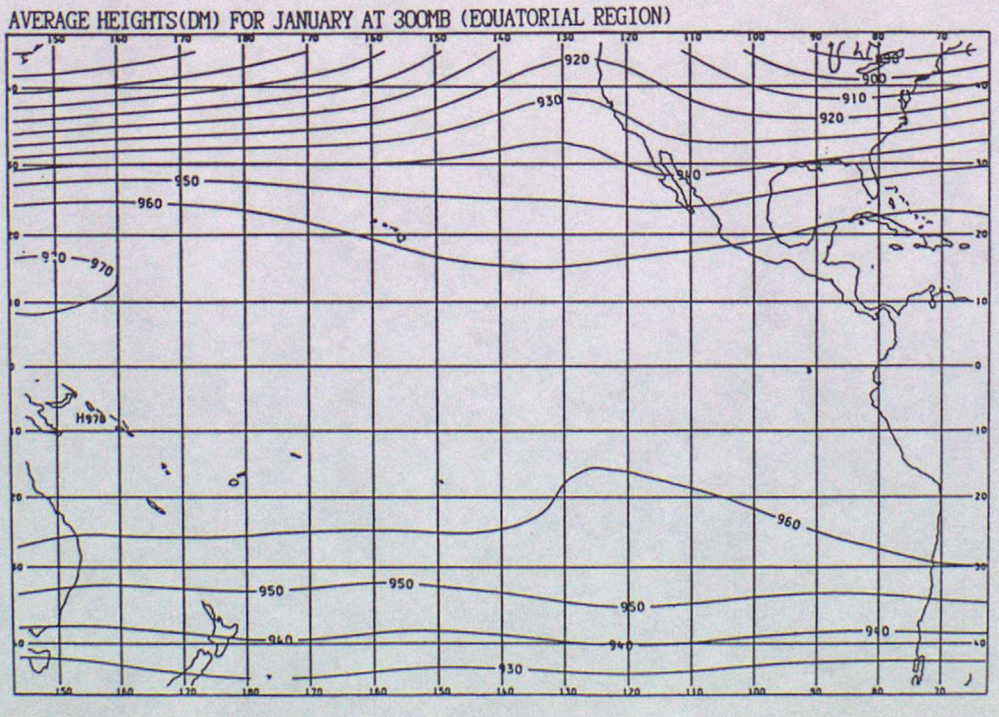

FIGURE 3(C)

AVERAGE HEIGHTS(DM) FOR JANUARY AT 300MB (N. HEMISPHERE)

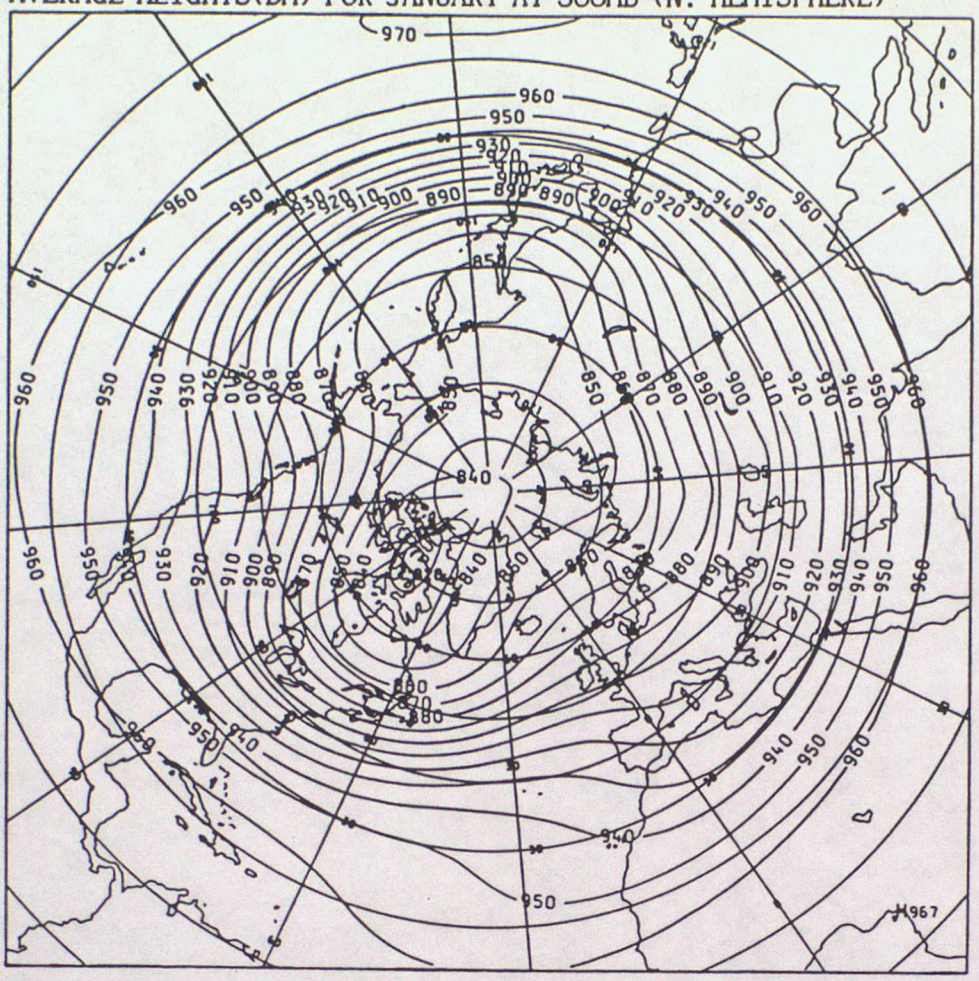

FIGURE 4(A)

AVERAGE HEIGHTS(DM) FOR JANUARY AT 300MB (S. HEMISPHERE)

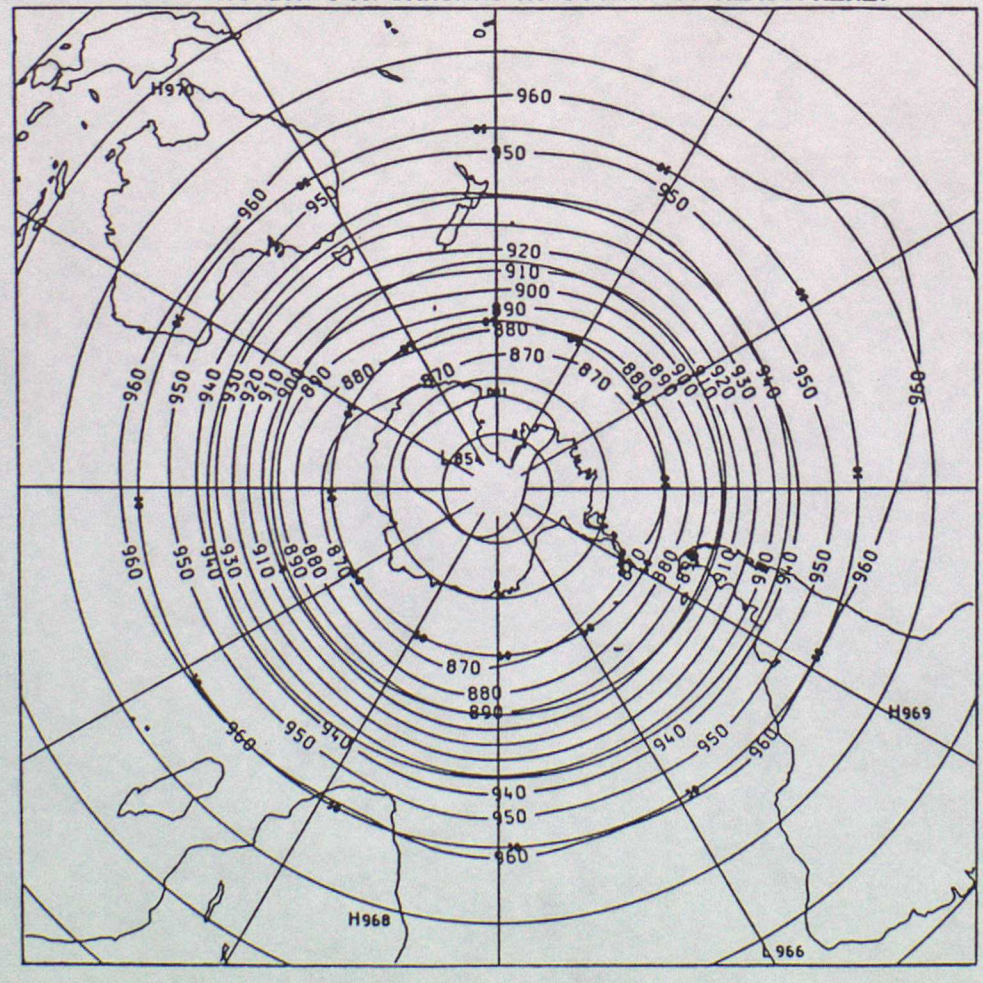

FIGURE 4(B)

AVERAGE TEMPERATURES(°C) FOR JANUARY AT 300MB (EQUATORIAL REGION)

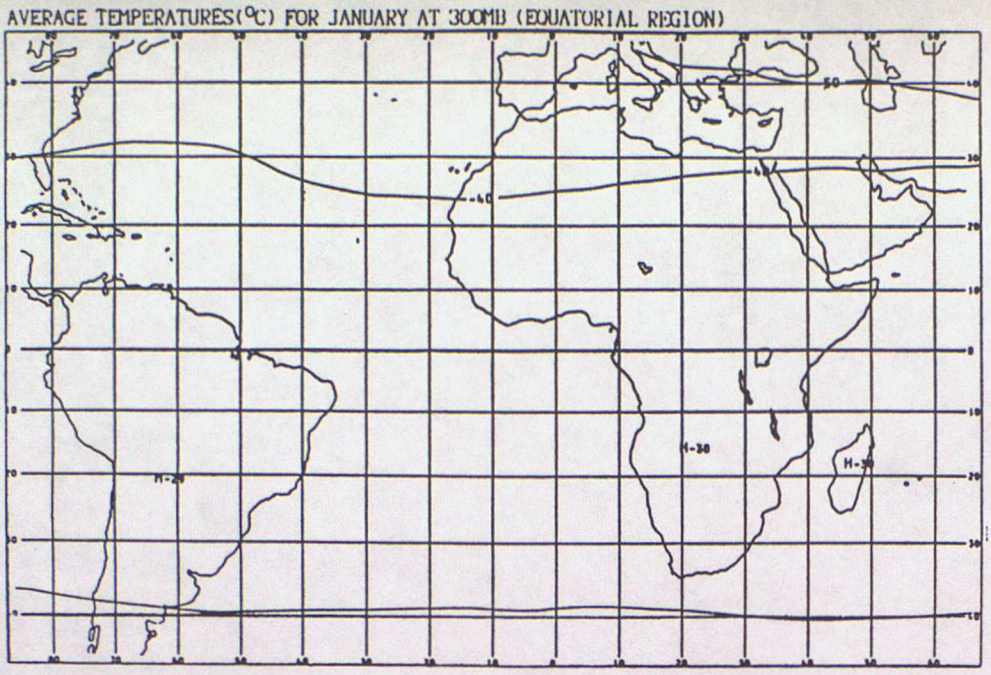

FIGURE 5(A)

AVERAGE TEMPERATURES(°C) FOR JANUARY AT 300MB (EQUATORIAL REGION)

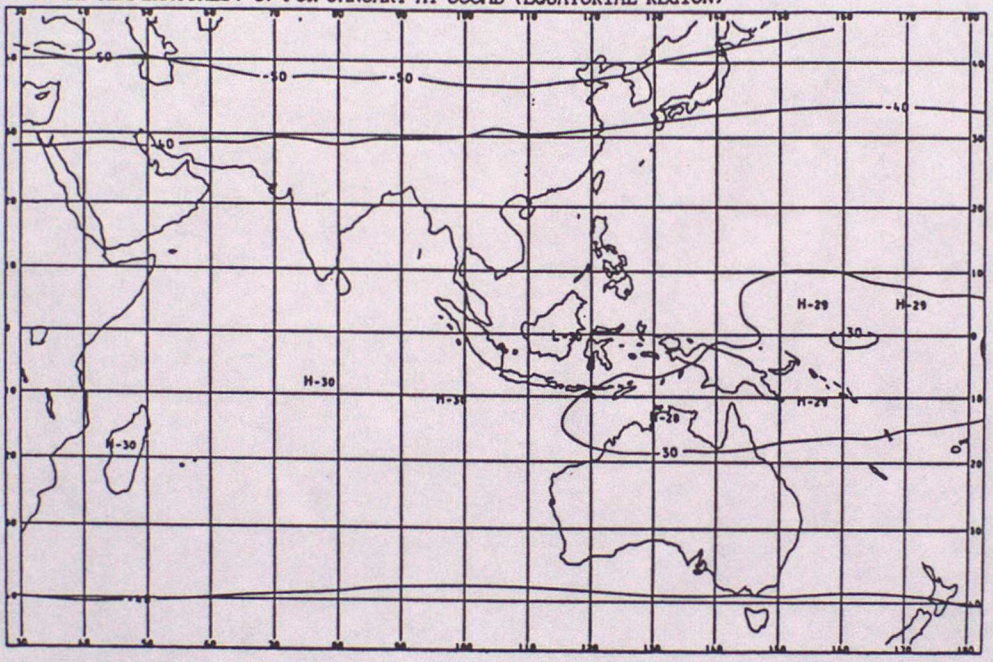

FIGURE 5(B)

AVERAGE TEMPERATURES(°C) FOR JANUARY AT 300MB (EQUATORIAL REGION)

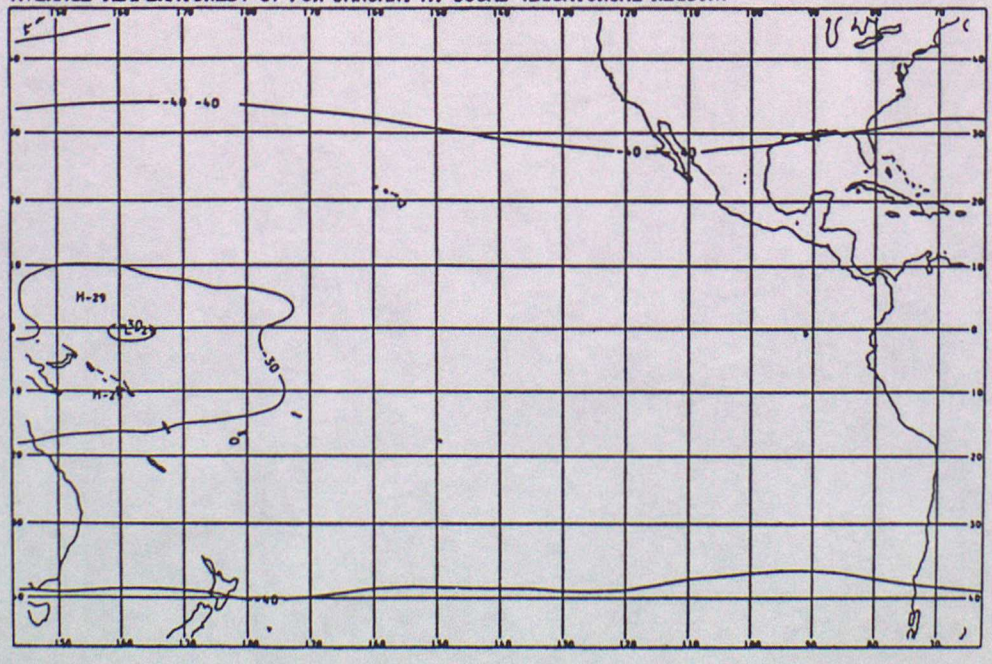

FIGURE 5(C)

AVERAGE TEMPERATURES(^{o}C) FOR JANUARY AT 300MB (N. HEMISPHERE)

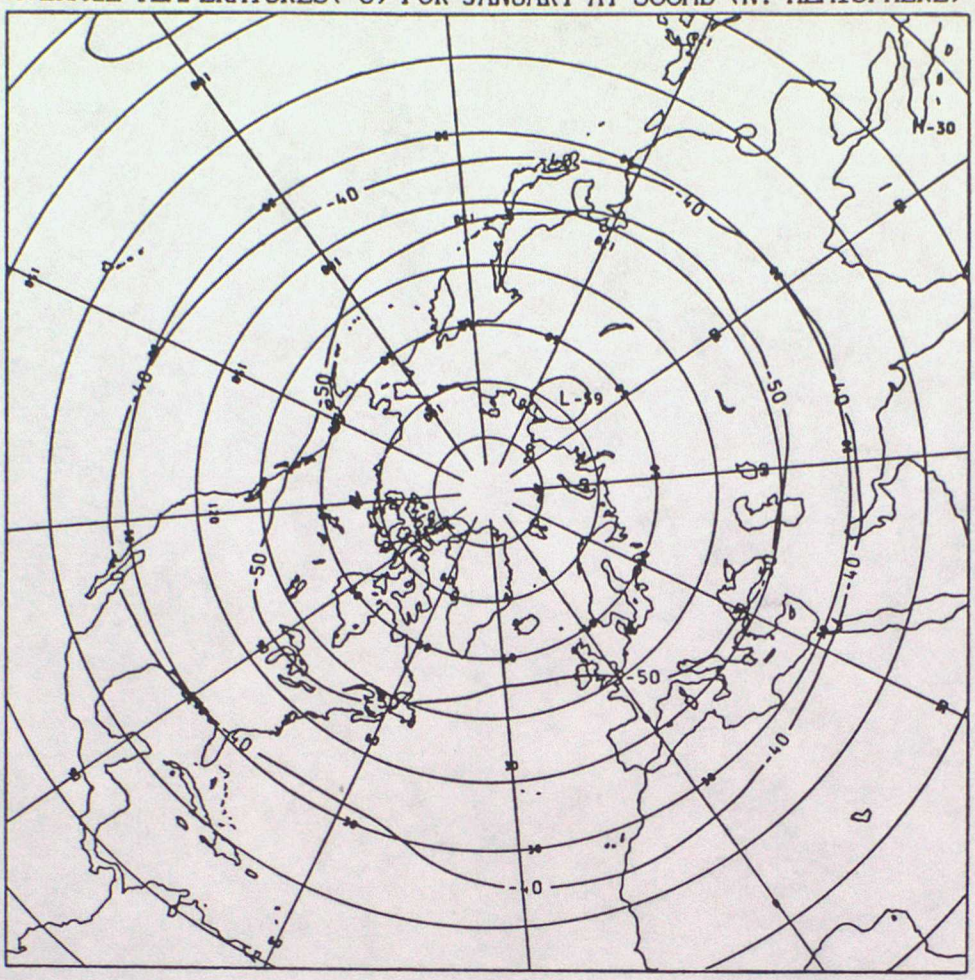

FIGURE 6(A)

AVERAGE TEMPERATURES(^{o}C) FOR JANUARY AT 300MB (S. HEMISPHERE)

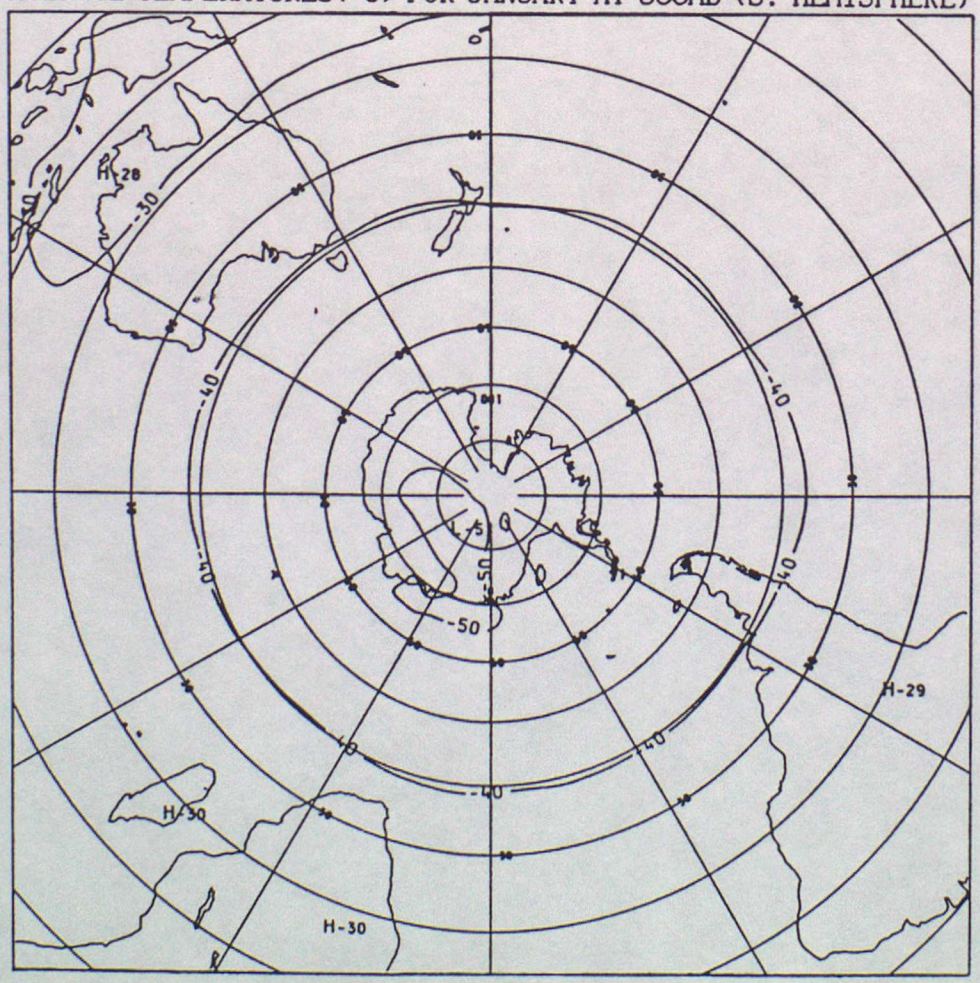

FIGURE 6(B)

AVERAGE WIND ARROWS(KT) FOR JULY AT 300MB (EQUATORIAL REGION)

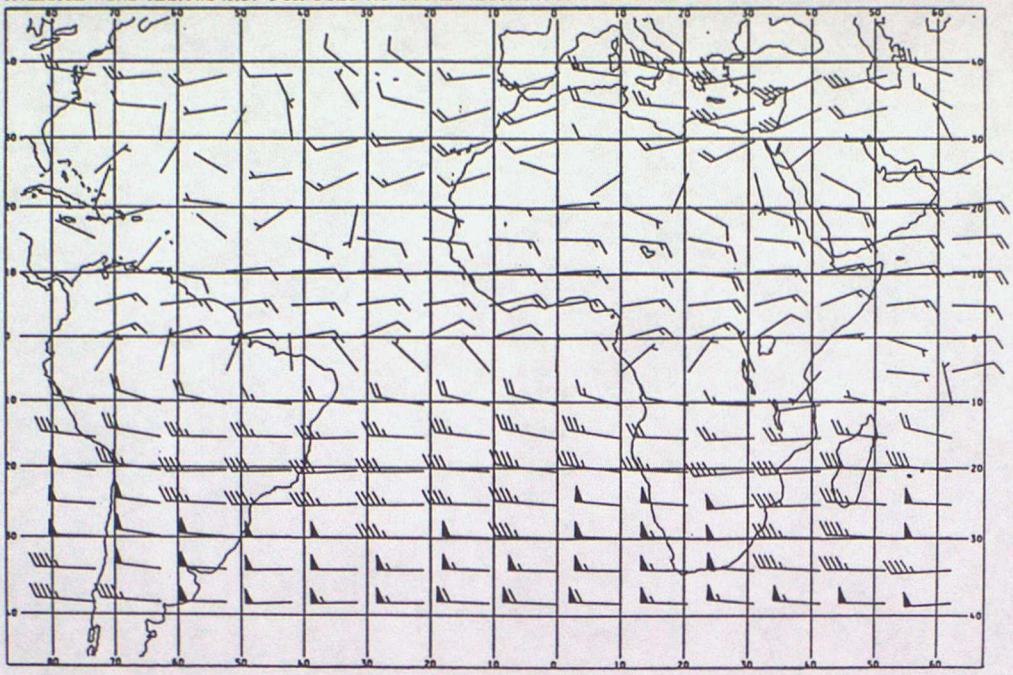

FIGURE 7(A)

AVERAGE WIND ARROWS(KT) FOR JULY AT 300MB (EQUATORIAL REGION)

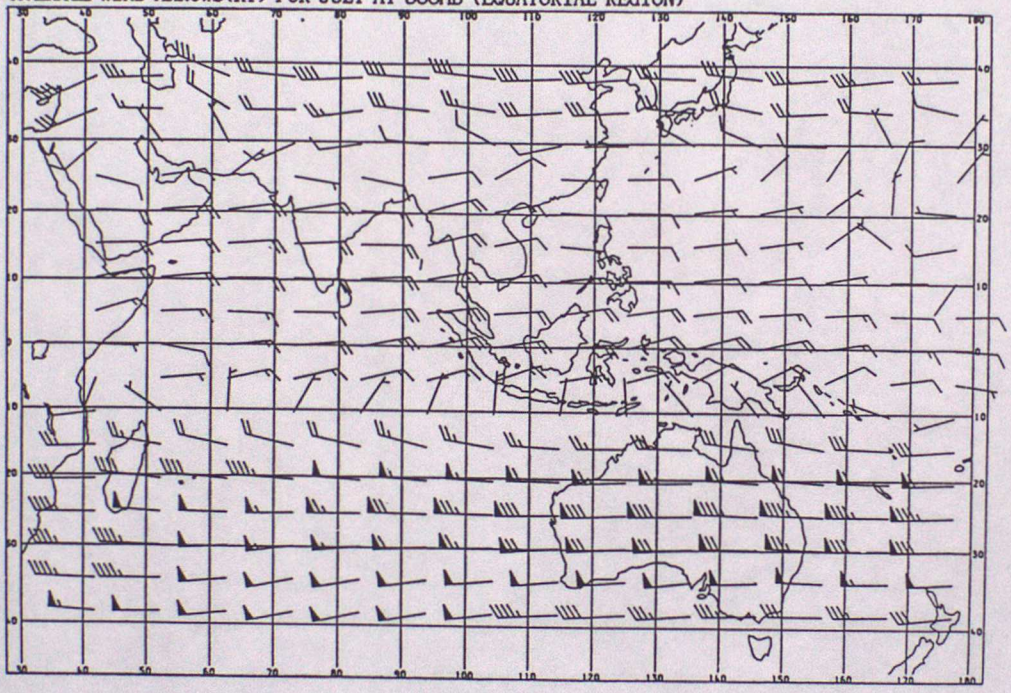

FIGURE 7(B)

AVERAGE WIND ARROWS(KT) FOR JULY AT 300MB (EQUATORIAL REGION)

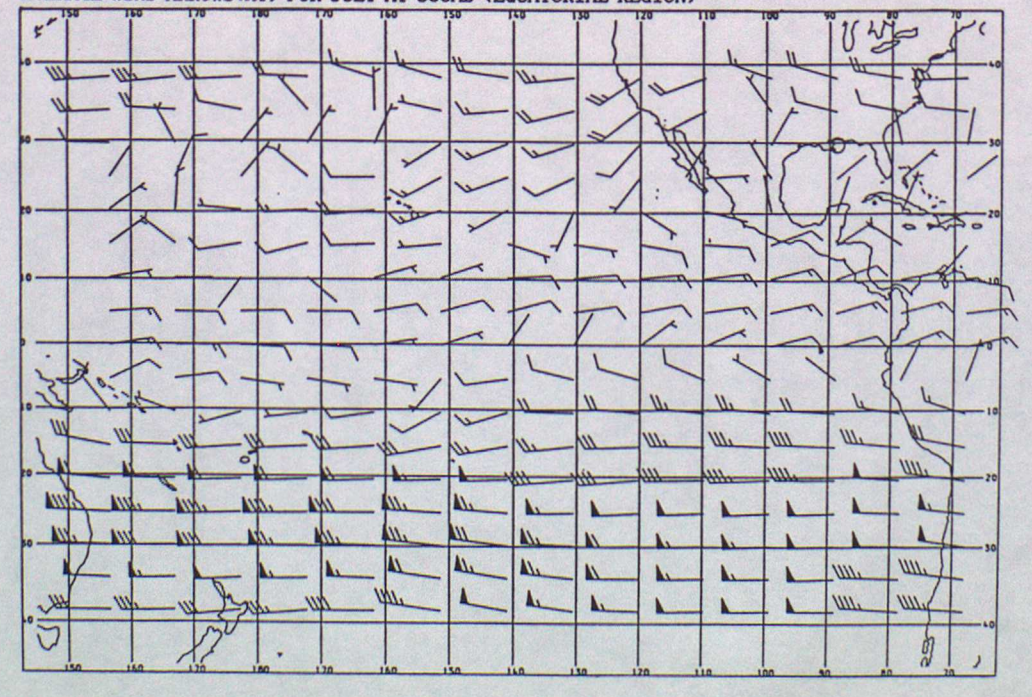

FIGURE 7(C)

AVERAGE WIND ARROWS(KT) FOR JULY AT 300MB (N. HEMISPHERE)

FIGURE 8(A)

AVERAGE WIND ARROWS(KT) FOR JULY AT 300MB (S. HEMISPHERE)

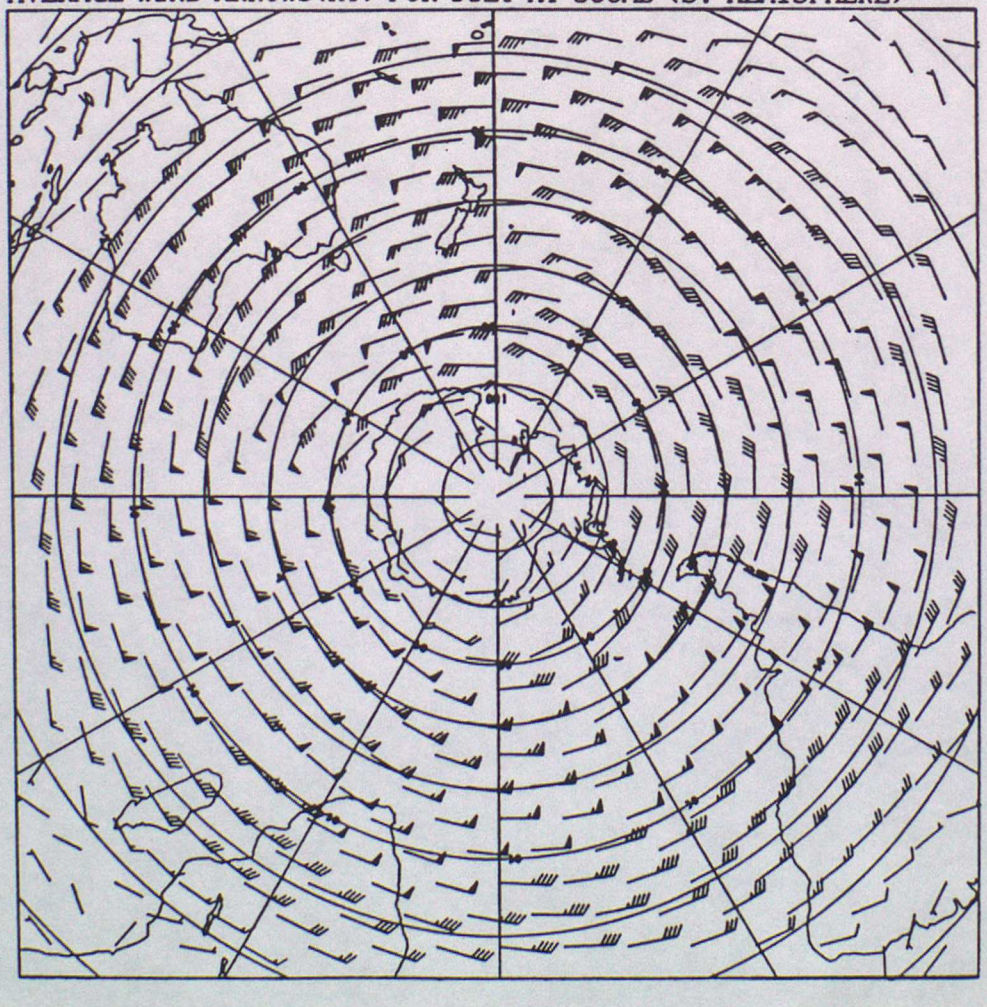

FIGURE 8(B)

AVERAGE HEIGHTS(DM) FOR JULY AT 300MB (EQUATORIAL REGION)

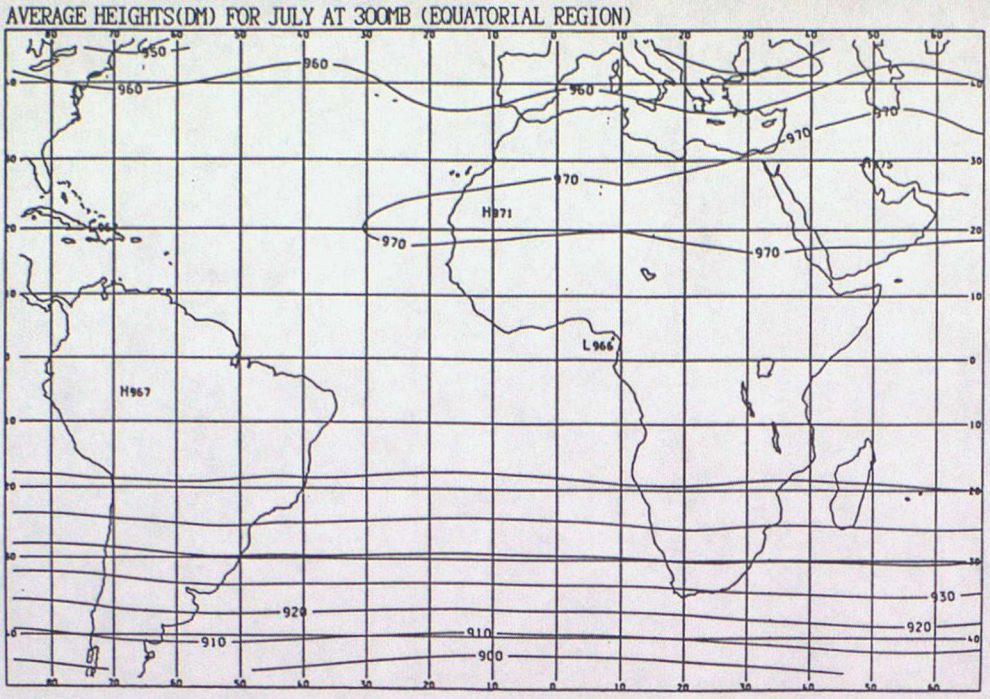

FIGURE 9(A)

AVERAGE HEIGHTS(DM) FOR JULY AT 300MB (EQUATORIAL REGION)

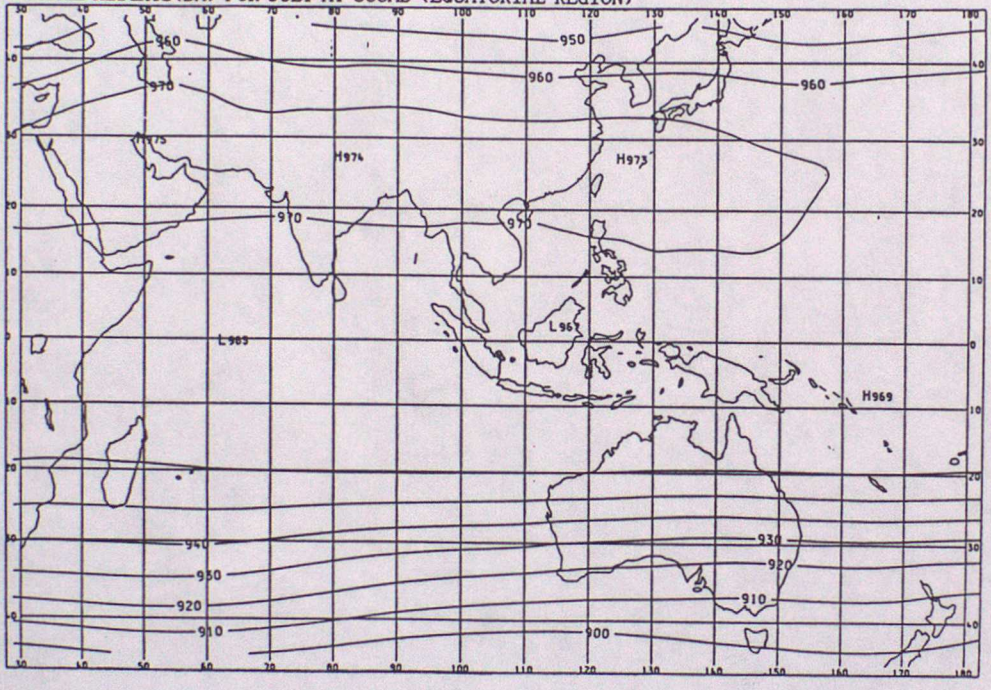

FIGURE 9(B)

AVERAGE HEIGHTS(DM) FOR JULY AT 300MB (EQUATORIAL REGION)

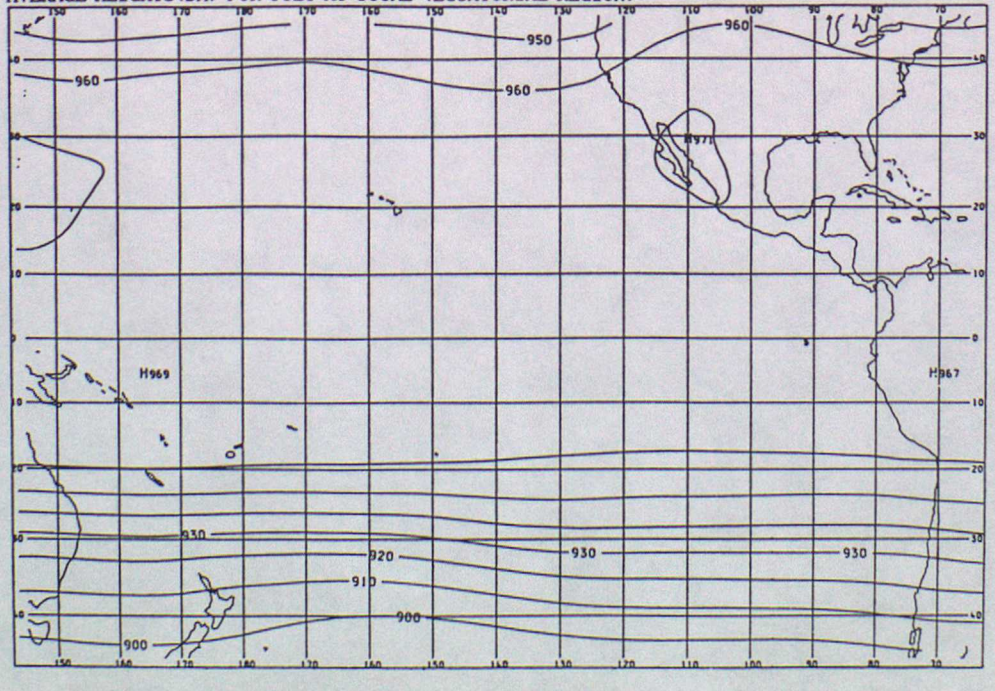

FIGURE 9(C)

AVERAGE HEIGHTS(DM) FOR JULY AT 300MB (N. HEMISPHERE)

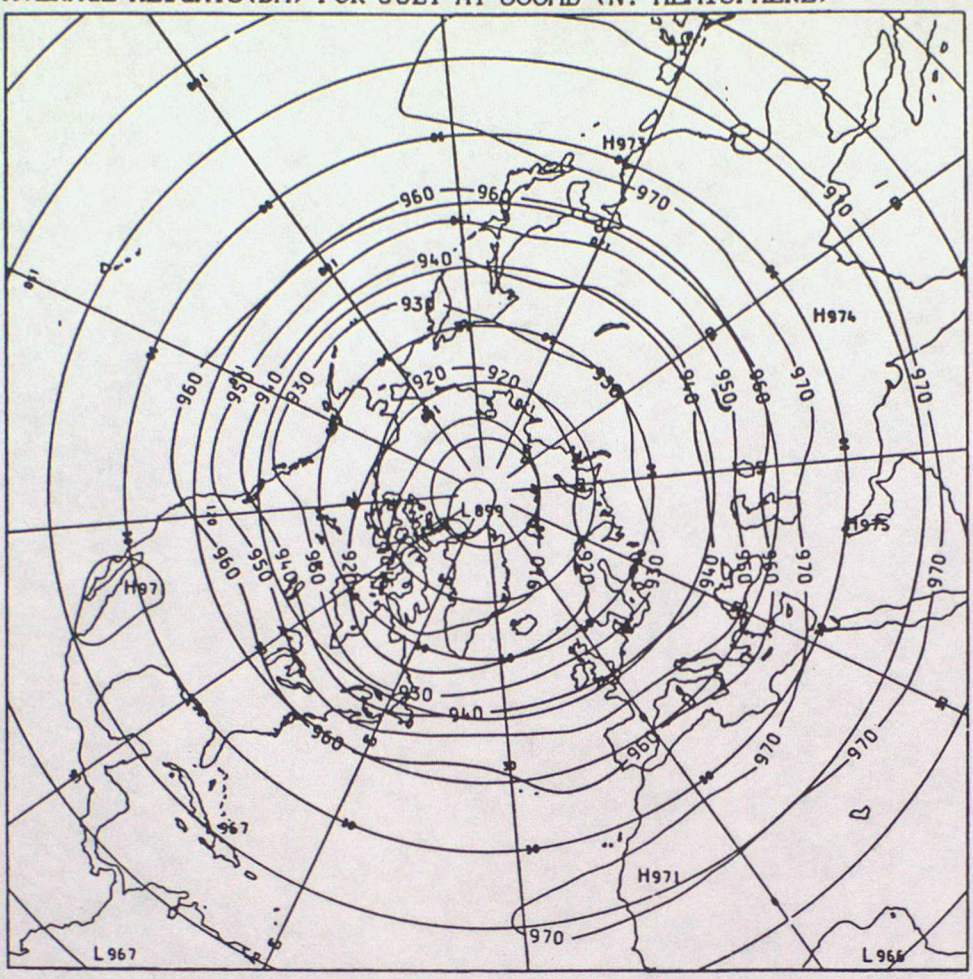

FIGURE 10(A)

AVERAGE HEIGHTS(DM) FOR JULY AT 300MB (S. HEMISPHERE)

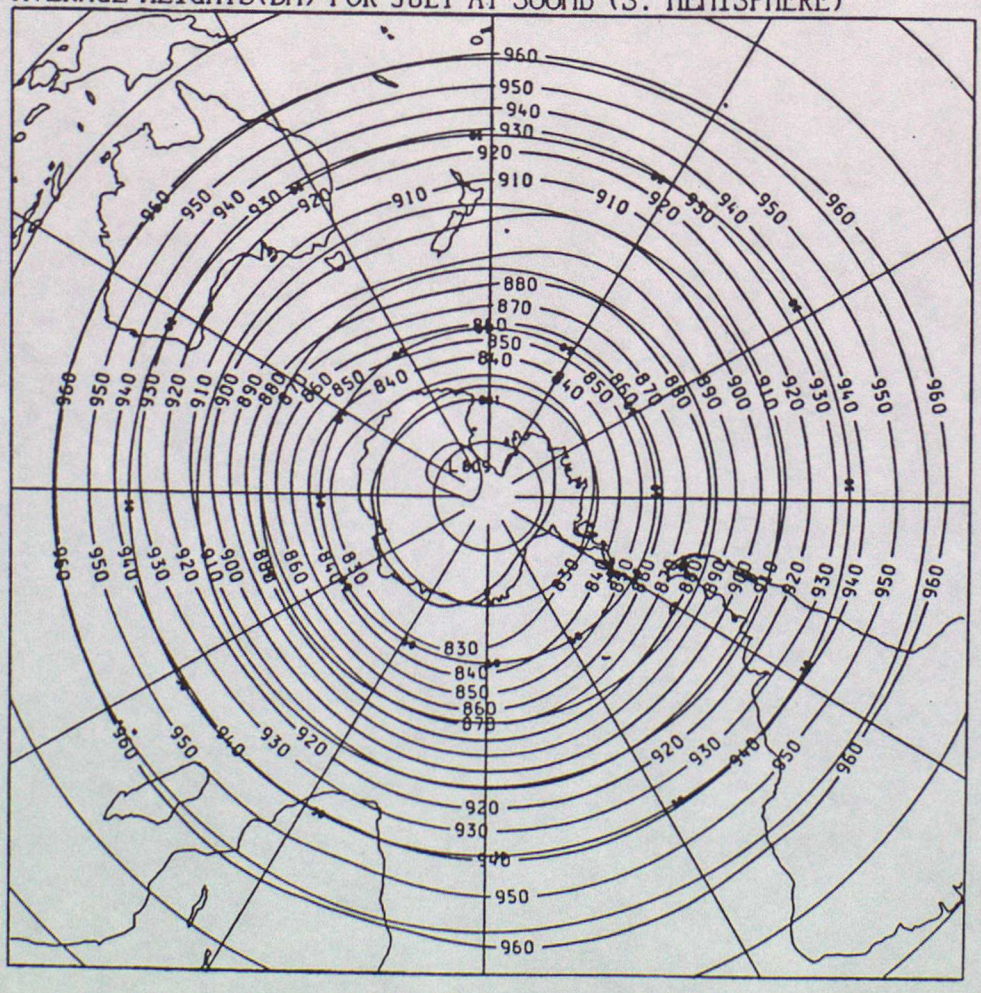

FIGURE 10(B)

AVERAGE TEMPERATURES(°C) FOR JULY AT 300MB (EQUATORIAL REGION)

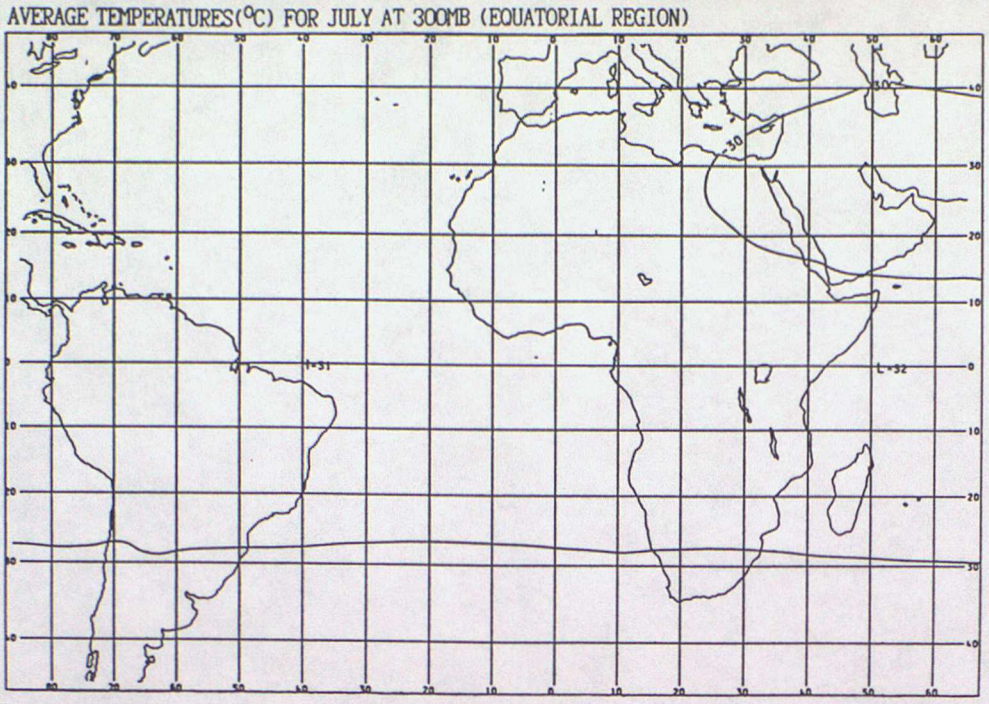

FIGURE 11(A)

AVERAGE TEMPERATURES(°C) FOR JULY AT 300MB (EQUATORIAL REGION)

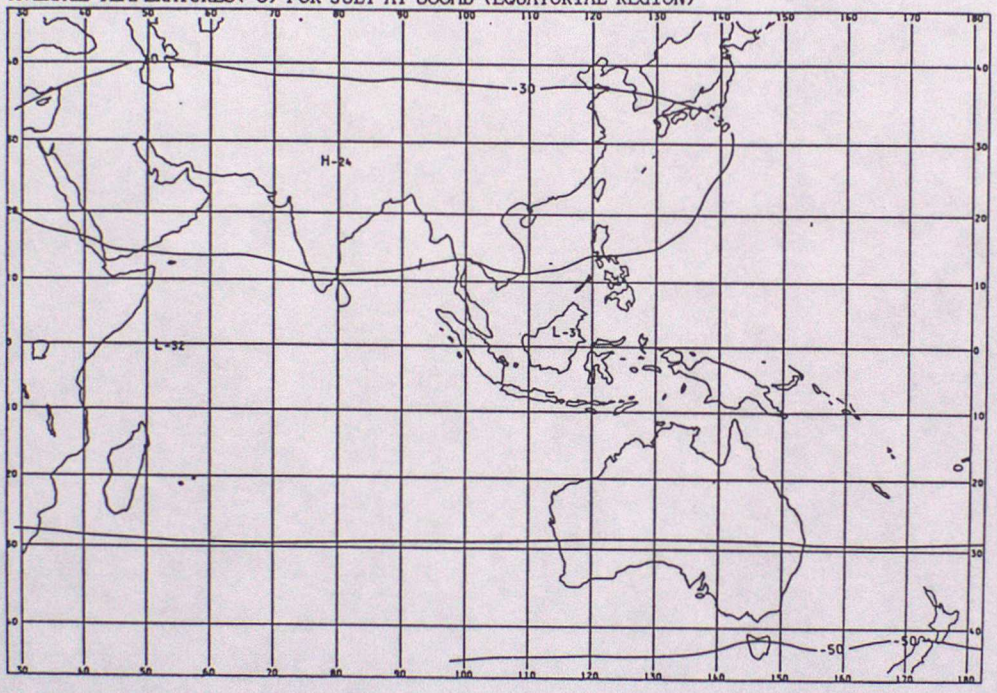

FIGURE 11(B)

AVERAGE TEMPERATURES(°C) FOR JULY AT 300MB (EQUATORIAL REGION)

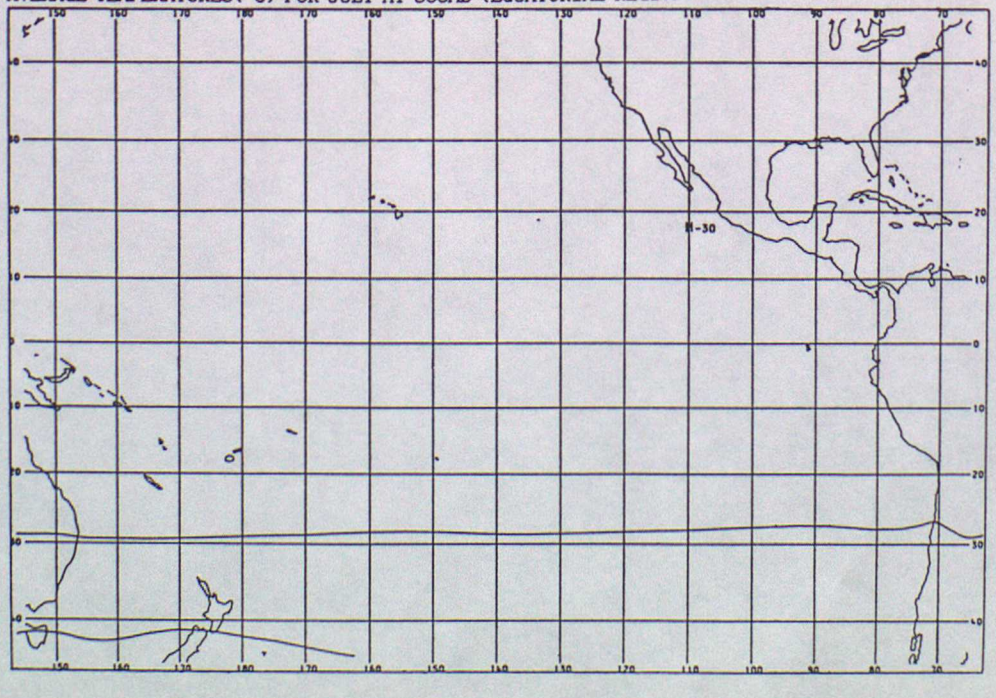

FIGURE 11(C)

AVERAGE TEMPERATURES(^{O}C) FOR JULY AT 300MB (N. HEMISPHERE)

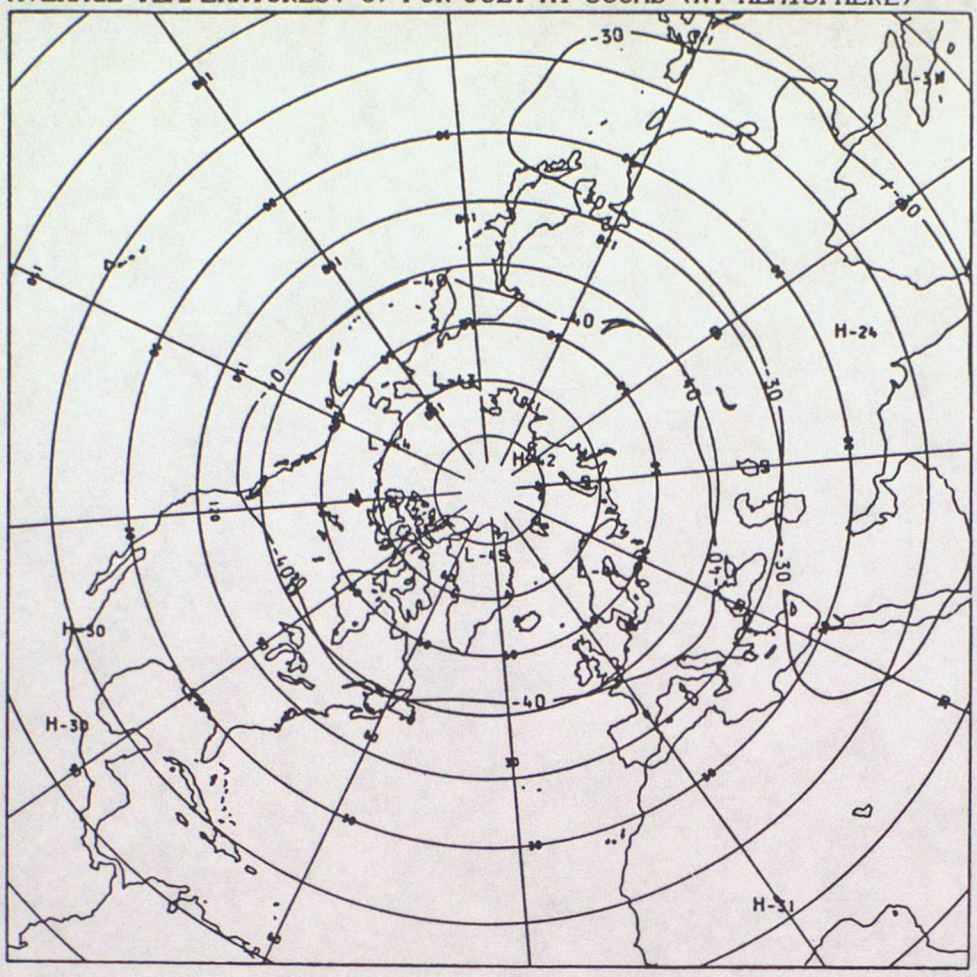

FIGURE 12(A)

AVERAGE TEMPERATURES(^{O}C) FOR JULY AT 300MB (S. HEMISPHERE)

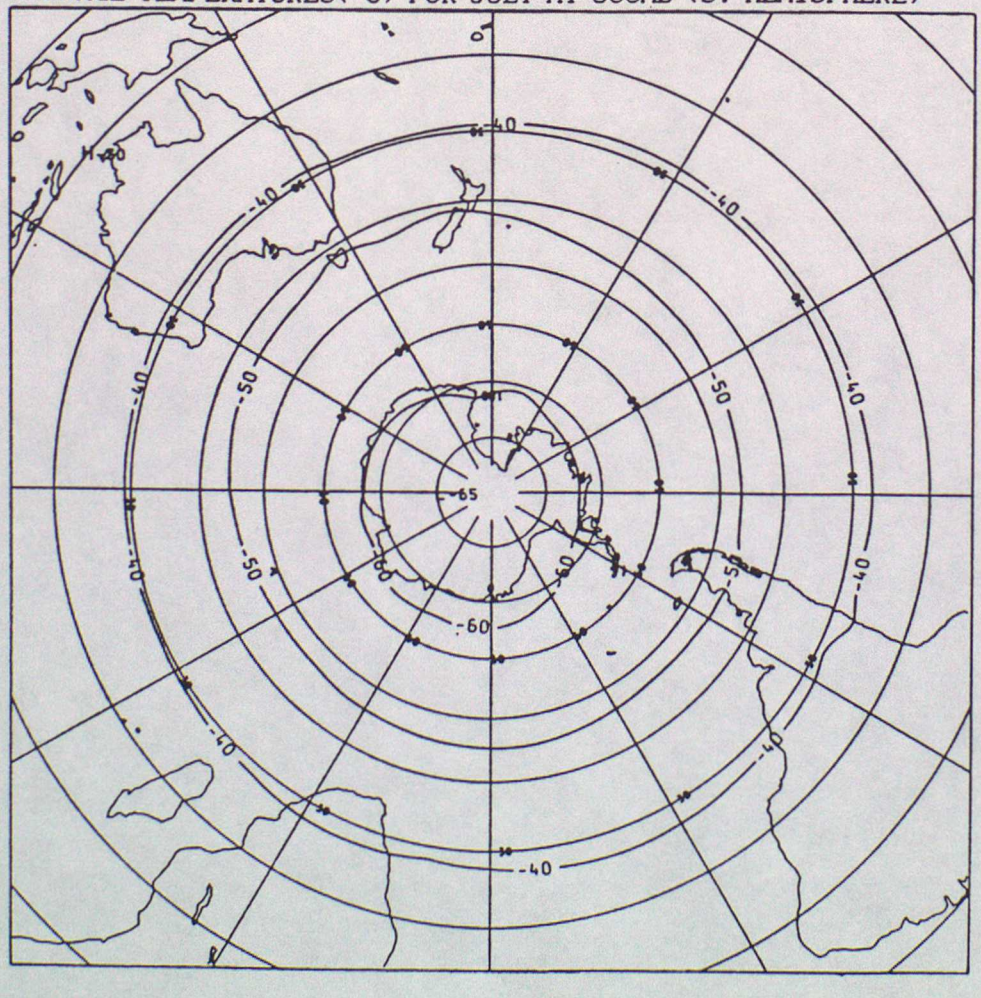

FIGURE 12(B)